

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-V EXAMINATION – WINTER 2025****Subject Code:3151309****Date:02-12-2025****Subject Name:Fundamentals of Air Pollution****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

|            |                                                                                                                                                                                                                                                                                                                                                                    | <b>MARKS</b> |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Q.1</b> | (a) Draw a chart of National Ambient Air Quality Monitoring Programme.                                                                                                                                                                                                                                                                                             | <b>03</b>    |
|            | (b) The exhaust gas emission from an automobile contains 1.5 percent by volume of carbon monoxide. What is the concentration of CO in mg/m <sup>3</sup> at NTP?                                                                                                                                                                                                    | <b>04</b>    |
|            | (c) Describe the following during stack monitoring condition in detail with sketch: <ol style="list-style-type: none"> <li>1. Velocity of gas stream is lower than the probe velocity</li> <li>2. Velocity of gas stream is higher than the probe velocity</li> <li>3. Velocity of gas stream is equal than the probe velocity</li> </ol>                          | <b>07</b>    |
| <b>Q.2</b> | (a) On the basis of the average temperature gradient in the situations described, classify the degree of stability of atmosphere: <ol style="list-style-type: none"> <li>(a) GL temperature is 25<sup>0</sup>C and temperature at 2000 m is 5<sup>0</sup>C</li> <li>(b) GL temperature is 70<sup>0</sup>F and temperature at 1900 ft is 48<sup>0</sup>F</li> </ol> | <b>03</b>    |
|            | (b) Draw types of atmospheric stability conditions & draw suitable plume behaviors observed during presence of these atmospheric stability conditions.                                                                                                                                                                                                             | <b>04</b>    |
|            | (c) Differentiate between followings with neat sketch: <ol style="list-style-type: none"> <li>(a) Radiance inversion and subsidence inversion</li> <li>(b) Dry Adiabatic lapse rate and Wet Adiabatic lapse rate</li> <li>(c) Stable condition and Unstable condition</li> </ol>                                                                                   | <b>07</b>    |
| <b>OR</b>  |                                                                                                                                                                                                                                                                                                                                                                    |              |
|            | (c) How Self Contained Circulatory System established in urban and rural area? Explain it with neat sketch.                                                                                                                                                                                                                                                        | <b>07</b>    |
| <b>Q.3</b> | (a) Distinguish between compression and rarefaction with neat sketch.                                                                                                                                                                                                                                                                                              | <b>03</b>    |
|            | (b) List out the various methods of Odour control.                                                                                                                                                                                                                                                                                                                 | <b>04</b>    |
|            | (c) It is required to find out the day-night equivalent noise level at a location. The four hourly day average values in dB are 55, 62, 61, 64 and four hourly night average values in dB are 35, 45. Compute L <sub>dn</sub> .                                                                                                                                    | <b>07</b>    |
| <b>OR</b>  |                                                                                                                                                                                                                                                                                                                                                                    |              |
| <b>Q.3</b> | (a) Enlist the sources of odours.                                                                                                                                                                                                                                                                                                                                  | <b>03</b>    |
|            | (b) Define and explain the following terms with units if expressions: <ol style="list-style-type: none"> <li>1. Sound power Level</li> <li>2. Sound Intensity</li> <li>3. Wavelength</li> <li>4. Frequency</li> </ol>                                                                                                                                              | <b>04</b>    |
|            | (c) "Odour is undoubtedly the most complex of all the air pollution problems." Do you agree with this statement? Give reasons.                                                                                                                                                                                                                                     | <b>07</b>    |

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|------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Q.4</b> | <b>(a)</b> | Define following terms:<br>1. Representative sample 2. Traverse points (sketch) 3. KIOSK                                                                                                   | <b>03</b> |
|            | <b>(b)</b> | Give the specification of followings:<br>1. Panel Box 2. Impingers 3. Set of nozzles 4. S-type Pitot tube                                                                                  | <b>04</b> |
|            | <b>(c)</b> | List Out various aspects of sampling to be considered while developing a sampling programme and explain each in detail.                                                                    | <b>07</b> |
| <b>OR</b>  |            |                                                                                                                                                                                            |           |
| <b>Q.4</b> | <b>(a)</b> | What is Turbulence? How is it formed in the stack?                                                                                                                                         | <b>03</b> |
|            | <b>(b)</b> | Draw a flowchart for measurement of sulphur dioxide from ambient air.                                                                                                                      | <b>04</b> |
|            | <b>(c)</b> | Briefly explain followings:<br>1. Selection of sampling location with sketch<br>2. Number of sampling port with sketch<br>3. Size of sampling port<br>4. Platform loading                  | <b>07</b> |
| <b>Q.5</b> | <b>(a)</b> | Define planetary boundary layer with sketch.<br>The wind has a velocity of 10 mi/hr at 10 m. On a day when lapse rate is small, what is the velocity at an elevation of 150 m in miles/hr? | <b>03</b> |
|            | <b>(b)</b> | What are three dominant mechanisms that account for dispersion of a pollutant into atmosphere?                                                                                             | <b>04</b> |
|            | <b>(c)</b> | Explain the effects of photochemical smog on human beings, plants and materials.                                                                                                           | <b>07</b> |
| <b>OR</b>  |            |                                                                                                                                                                                            |           |
| <b>Q.5</b> | <b>(a)</b> | Explain the term “oxidants”. How are they measured?                                                                                                                                        | <b>03</b> |
|            | <b>(b)</b> | Enlist factors affecting photochemical reaction.                                                                                                                                           | <b>04</b> |
|            | <b>(c)</b> | Write the limitations of Gaussian Dispersion Model.                                                                                                                                        | <b>07</b> |

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2024****Subject Code:3151309****Date:17-12-2024****Subject Name:Fundamentals of Air Pollution****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

|            |                                                                                                                                                                                                                                | <b>Marks</b> |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Q.1</b> | (a) Define Air pollution. Enlist and explain the sources of air pollution in detail.                                                                                                                                           | <b>03</b>    |
|            | (b) Explain the effects of Particulate matter on human, animals and vegetation.                                                                                                                                                | <b>04</b>    |
|            | (c) Derive an expression for the dry adiabatic lapse rate.                                                                                                                                                                     | <b>07</b>    |
| <b>Q.2</b> | (a) Explain primary and secondary air pollutants with examples.                                                                                                                                                                | <b>03</b>    |
|            | (b) Describe the effects of Sulfur dioxide on human health, vegetation & materials.                                                                                                                                            | <b>04</b>    |
|            | (c) Define Maximum mixing depth and explain it with example.                                                                                                                                                                   | <b>07</b>    |
| <b>OR</b>  |                                                                                                                                                                                                                                |              |
|            | (c) Briefly explain the Heat Island Effect with neat sketch.                                                                                                                                                                   | <b>07</b>    |
| <b>Q.3</b> | (a) Write Down the Factors Affecting Meteorological Condition?                                                                                                                                                                 | <b>03</b>    |
|            | (b) The exhaust gas from an automobile contains 3% by volume of carbon monoxide. What is the concentration of CO in milligrams per cubic meter (mg/m <sup>3</sup> ) at 25°C and 1 atm pressure?                                | <b>04</b>    |
|            | (c) Explain Wind rose diagram and enlist its application. Discuss wind velocity profile in detail with neat sketch.                                                                                                            | <b>07</b>    |
| <b>OR</b>  |                                                                                                                                                                                                                                |              |
| <b>Q.3</b> | (a) Define proximate and ultimate analysis of fuel.                                                                                                                                                                            | <b>03</b>    |
|            | (b) The concentration of CO in cigarette smoke reaches level of 420 ppm or higher. For this particular value determine the percentage by volume and the concentration in milligram per cubic meter at 25 °C and 1atm pressure. | <b>04</b>    |
|            | (c) Classify the plume behavior, explain it with diagram.                                                                                                                                                                      | <b>07</b>    |
| <b>Q.4</b> | (a) Define following terms: (a) Aerosol (b) Mist (c) Fog.                                                                                                                                                                      | <b>03</b>    |
|            | (b) Define Inversion and explain the subsidence and radiation inversion.                                                                                                                                                       | <b>04</b>    |
|            | (c) State the use of High volume sampler and also explain its working.                                                                                                                                                         | <b>07</b>    |
| <b>OR</b>  |                                                                                                                                                                                                                                |              |
| <b>Q.4</b> | (a) Explain in detail Isokinetic sampling.                                                                                                                                                                                     | <b>03</b>    |
|            | (b) Why Isokinetic Sampling is important in Stack Monitoring? Justify with example.                                                                                                                                            | <b>04</b>    |
|            | (c) Explain the step by step procedure of stack monitoring.                                                                                                                                                                    | <b>07</b>    |

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|------------|------------|--------------------------------------------------------------|-----------|
| <b>Q.5</b> | <b>(a)</b> | Write down the effects of Noise on human.                    | <b>03</b> |
|            | <b>(b)</b> | Briefly explain the characteristics of Noise.                | <b>04</b> |
|            | <b>(c)</b> | Explain the methods used for the control of Noise pollution. | <b>07</b> |

**OR**

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|------------|------------|-----------------------------------------------------|-----------|
| <b>Q.5</b> | <b>(a)</b> | Define odor. Explain the characteristics of odor.   | <b>03</b> |
|            | <b>(b)</b> | Enlist factors affecting photochemical reaction.    | <b>04</b> |
|            | <b>(c)</b> | Enlist odor control techniques and explain any one. | <b>07</b> |

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2023****Subject Code:3151309****Date:20-12-2023****Subject Name:Fundamentals of Air Pollution****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

|     |                                                                                                                                                                                           | MARKS |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Q.1 | (a) Define air pollution & give classification of sources of air pollution.                                                                                                               | 03    |
|     | (b) Make a list of fuels and name the potential air pollutants generated from each type of fuels.                                                                                         | 04    |
|     | (c) Mention the purpose of stack monitoring & explain the need of iso kinetic sampling.                                                                                                   | 07    |
| Q.2 | (a) Define the lapse rate & explain the method for determination of environmental lapse rate for a particular location.                                                                   | 03    |
|     | (b) Name the six types of plume behavior & draw line diagram of that plume which can be observed during strong inversion condition of atmosphere.                                         | 04    |
|     | (c) Write a short note on Maximum mixing depth.                                                                                                                                           | 07    |
|     | <b>OR</b>                                                                                                                                                                                 |       |
|     | (c) Write a short note on heat island effect with neat sketch.                                                                                                                            | 07    |
| Q.3 | (a) List down the odor pollution detection instruments used in field.                                                                                                                     | 03    |
|     | (b) Discuss the odor characteristics.                                                                                                                                                     | 04    |
|     | (c) Enlist various noise control strategies & explain any three in details.                                                                                                               | 07    |
|     | <b>OR</b>                                                                                                                                                                                 |       |
| Q.3 | (a) Differentiate between sound & noise.                                                                                                                                                  | 03    |
|     | (b) Enlist the odor pollution control technology & explain any two in detail.                                                                                                             | 04    |
|     | (c) Write a short note on effects of noise on human.                                                                                                                                      | 07    |
| Q.4 | (a) Write down the application of the following equipment,                                                                                                                                | 03    |
|     | I. Anemometer                                                                                                                                                                             |       |
|     | II. Thermocouple                                                                                                                                                                          |       |
|     | III. Manometer                                                                                                                                                                            |       |
|     | (b) Discuss important requirements for carrying out the ambient air quality monitoring.                                                                                                   | 04    |
|     | (c) Write down the Gaussian dispersion equation & discuss the assumptions thereof.                                                                                                        | 07    |
|     | <b>OR</b>                                                                                                                                                                                 |       |
| Q.4 | (a) Define the plume rise & write down any two equations of plume rise calculation.                                                                                                       | 03    |
|     | (b) Discuss the applications of Wind rose diagram in the field of environmental engineering.                                                                                              | 04    |
|     | (c) Write short note on High Volume Air Sampler (HVAS).                                                                                                                                   | 07    |
| Q.5 | (a) Explain the role of oxides of nitrogen in photo oxidation.                                                                                                                            | 03    |
|     | (b) Find out the flow of flue gas and particulate matter concentration in mg/Nm <sup>3</sup> . Type of fuel is lignite (Mata no madh), fuel consumption is 2 T/day. Assume suitable data. | 04    |
|     | (c) Define the particulate matter & discuss the effects of particulate matter on human health & plants.                                                                                   | 07    |
|     | <b>OR</b>                                                                                                                                                                                 |       |
| Q.5 | (a) Enlist the four factors responsible for formation of photochemical smog.                                                                                                              | 03    |
|     | (b) The Concentration of CO in cigarette smoke reaches 200 ppm. For this particular value determine the percent by volume and concentration in mg/m <sup>3</sup> at 25°C and 1 atm.       | 04    |
|     | (c) Discuss the effects of oxides of sulfur on human health, plants & property.                                                                                                           | 07    |

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2022****Subject Code:3151309****Date:09-01-2023****Subject Name:Fundamentals of Air Pollution****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

**MARKS**

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|------------|------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Q.1</b> | <b>(a)</b> Enlist the different types of fuels used in vehicles also enlist the air pollutants emitted by each type of fuel. | <b>03</b> |
|            | <b>(b)</b> Define Air Pollutants. Enlist various sources of Air pollutants. Explain the classification of Air Pollutants.    | <b>04</b> |
|            | <b>(c)</b> Write a detailed note on “Procedure for stack gases Sampling.”                                                    | <b>07</b> |
| <b>Q.2</b> | <b>(a)</b> Give the difference between Dry adiabatic and wet adiabatic lapse rate.                                           | <b>03</b> |
|            | <b>(b)</b> Define inversion. Give at least three differences between radiation Inversion and subsidence inversion.           | <b>04</b> |
|            | <b>(c)</b> Discuss the Effects of Carbon Monoxide on Plants, Vegetation and Human health.                                    | <b>07</b> |
|            | <b>OR</b>                                                                                                                    |           |
|            | <b>(c)</b> Describe the effects of Sulfur dioxide on human health, vegetation & materials.                                   | <b>07</b> |
| <b>Q.3</b> | <b>(a)</b> Enlist the four factors responsible for formation of photochemical Smog.                                          | <b>03</b> |
|            | <b>(b)</b> Enlist the meteorological factors influencing the air pollution and explain any one in brief.                     | <b>04</b> |
|            | <b>(c)</b> Give classification of plume behavior. Show their temperature, velocity profile along with the plume shape.       | <b>07</b> |
|            | <b>OR</b>                                                                                                                    |           |
| <b>Q.3</b> | <b>(a)</b> Write a short note on heat island effect.                                                                         | <b>03</b> |
|            | <b>(b)</b> Derive the equation of DALR ( $-dT/dz = 9.8^{\circ} \text{C/km}$ ).                                               | <b>04</b> |
|            | <b>(c)</b> Explain Wind rose diagram and enlist its application.                                                             | <b>07</b> |
| <b>Q.4</b> | <b>(a)</b> Explain Photo chemical smog in brief.                                                                             | <b>03</b> |
|            | <b>(b)</b> Which pollutants are measures from the stack? Enlist those pollutants with its permissible limits.                | <b>04</b> |
|            | <b>(c)</b> Explain in brief: Construction and Working of a High Volume Sampler                                               | <b>07</b> |
|            | <b>OR</b>                                                                                                                    |           |
| <b>Q.4</b> | <b>(a)</b> Differentiate between sound and noise.                                                                            | <b>03</b> |
|            | <b>(b)</b> Explain the effects of Noise on Human health.                                                                     | <b>04</b> |
|            | <b>(c)</b> What do you mean by the term MMD? Explain in brief radiosonde measurements.                                       | <b>07</b> |

- Q.5 (a)** The exhaust gas from an automobile contains 1.5 percent by volume of carbon monoxide. What is the concentration of CO in milligrams per cubic meter ( $\text{mg/m}^3$ ) at  $25^\circ\text{C}$  and 1 atm pressure? **03**
- (b)** Explain the Role of oxides of nitrogen in photo oxidation. **04**
- (c)** Explain the methods used for the control of Noise pollution. **07**
- OR**
- Q.5 (a)** If, Sound power from a tool is 0.0015watt, then what is sound power level? **03**
- (b)** State eight characteristics of odor. **04**
- (c)** Enlist the methods to eliminate the odors and explain any three methods in brief. **07**

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